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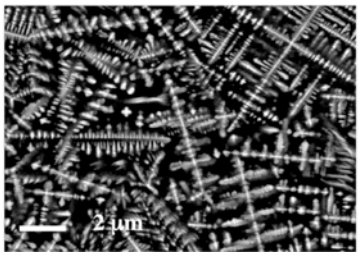
X-ray Rietveld Quantitative Phase Analysis of Ferrimagnetic Bioglass Ceramics. Th. Leventouri[1], A. C. Kis[2], I. M. Anderson[3], [1]Physics Dept. Florida Atlantic Univ., Boca Raton, FL 33431, USA, [2]Dept. of Physiology, Univ. of Toronto, Toronto, Ontario, M5S 1A8, Canada[3], Metals and Ceramics Div., Oak Ridge National Laboratory, Oak Ridge TN 37830 USA.

Ferrimagnetic bioglass ceramics (FBC) have been successfully tested to preferentially kill bone cancer cells in animals by local heating via magnetic hysteresis of magnetite. Weight fractions of the phases in the system [0.45(CaO,P_2O_5) (0.52-x)SiO_2 xFe_2O_3 0.03Na_2O], x=0.05, 0.10, 0.15, 0.20, were estimated by X-ray Rietveld refinements. EDX studies show that for x=0.20 magnetite forms bright long dendrites as in the SEM image, a glassy dark calcium silicate rich phase, and a calcium phosphate rich phase. Calculated powder patterns were derived from the structural data for monoclinic and hexagonal $Ca_3(PO_4)_2$, orthorhombic (Imma) Fe_3O_4, hexagonal Fe_2O_3, and monoclinic SiO_2. Calcium phosphate and magnetite develop as major crystalline phases in fractions that vary with the composition of starting oxides and annealing temperature. For x=0.10 and 0.20, calcium phosphate undergoes a gradual transition from monoclinic to rhombohedral crystal system (SG P21/a→R3c) as the annealing temperature increases from 800 to 1100 ºC.



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